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INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

S-E-C-R-E-T

50X1-HUM

COUNTRY	Hungary	REPORT	[redacted]
SUBJECT	Communications Developments in Hungary	DATE DISTR.	[illegible]
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SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

[redacted]

1. [redacted] 15-page report (with master mats and seven sketches) [redacted] This report contains communications information on short-wave jamming transmitters, the Hungarian army radio school, Hungarian air defense stations, and miscellaneous communications equipment.

[redacted]

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STATE	X	ARMY	#X	NAVY	#X	AIR	#X	NSA		FBI					

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COUNTRY: Hungary

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Jamming.

1. Short-Wave Jamming Transmitters. In 1951, the Hungarian Transmitting Tube Factory [redacted] was directed to modify communications transmitters at the former overseas communication station of the Hungarian Central Post Office at Szekesfehervar, about 45 kilometers southwest of Budapest. The transmitters, six short-wave and two long-wave 15-kilowatt units, were to be converted to jammers. The transmitters had been built and installed by the plant, then known as the Hungarian Philips Company, shortly before the Communists took it over in 1947 or 1948. [redacted] Sziraki (fnu) [redacted] was apparently the leader of the group at the Central Post Office assigned to handle the modification of the transmitters. 50X1-HUM 50X1-HUM 50X1-HUM

2. At first the modification consisted mainly of adding an audio-frequency oscillator for amplitude-modulating the carrier and improving the air-cooling system so that the equipment could be operated up to 23 hours per day. Jamming of foreign broadcasts with the amplitude-modulated jammers, however, proved relatively ineffective. Many radio experimenters and hobbyists were able to eliminate the effect of the jammers on their receivers almost completely by the addition of a simple feedback circuit.

3. In fall 1951, the Hungarian Transmitting Tube Factory received from Moscow special oscillator units to replace the units in the jamming transmitters. The new units were equipped with a motor-driven wobbulator for frequency-modulating the carrier while amplitude modulation was applied simultaneously. The modulation frequency was on the order of 50 cps. Some circuits in the transmitters had to be modified to pass the resulting side bands more effectively. The installation of the modulator units in all transmitters was completed by spring 1952. The resulting jammers were much more effective than before and could not be circumvented by the simple feedback circuits used against the AM jammers. The short-wave jamming transmitters covered the frequency range 1.5 to 15 megacycles.

4. Other Jamming Sites. [redacted] jamming installations similar to the one at Szekesfehervar existed near all major cities in Hungary. [redacted] the jammers throughout Hungary were controlled from a monitoring station in the vicinity of Budapest. Each jammer was assigned a Morse code call, which was transmitted once each minute for the purpose of simplifying control problems. In winter 1952 a special group was set up to maintain the jamming transmitters. [redacted] 50X1-HUM 50X1-HUM

Hungarian Army Radio School.

5. In 1953, [redacted] engineers of the Voeroes Szirka Factory, a part of the Hungarian Transmitter Tube Company, were instructed to set up a training course for operators and maintenance personnel concerned with equipment produced by the factory. [redacted] the school was being set up because of the constant stream of complaints from the field about unsatisfactory operation of equipment. Apparently the equipment was being operated and maintained by very unskilled personnel, and the factory management had asked the army to establish a course in order to put a stop to the complaints. 50X1-HUM 50X1-HUM

6. The school was established in a military casern, Petoefi Barracks, in the outskirts of Budapest [redacted] on Buda Orsi Road, in the direction of the former civilian airport. [redacted] the course was set up 50X1-HUM

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and run under the general supervision of the Defense Ministry [redacted], About 50 students attended the initial session.

7. The course lasted six months and was divided about equally among three general areas:

   a. Elementary theory, which introduced the student to basic principles such as Ohm's Law and Kirchoff's Laws, network theory, the operation of vacuum tubes, etc.

   b. Theory of equipment, which treated the theory of operation of the various components of modern receivers and transmitters.

   c. Practical application, which dealt with the different pieces of equipment produced by the Voeroes Szirka Factory, with emphasis on proper operational procedures and methods of trouble shooting.

8. After the first course was completed, the instructors were asked to write up the material that had been presented in the different subjects. This material was turned over to the Defense Ministry, and [redacted] the course was to be continued, probably using the best students from the initial session as instructors. [redacted] 50X1-HUM

Communications Stations in the Hungarian Air Defense System. 50X1-HUM

9. [redacted] early warning radar sites of the Hungarian air defense system. These were at Papa, Sarvar, Szentgotthard, Kaposvar, Nagykanizsa, Villany, and Szekesfehervar. The communications equipment in the stations generally consisted of an R-50 transmitter [redacted] problems experienced with the transmitter [redacted] arose partly from the use of inexperienced operators and maintenance personnel, and partly from the very poor quality of the components available in Hungary before 1954.

10. [redacted] the radars [redacted] were 500 meters to several kilometers from the communications stations and were connected with them by telephone lines. [redacted] two types of radar antennas: the Yagi type and another consisting of two parabolic sections mounted on a trailer bed, one section horizontally and the other at an angle. The second type [redacted] at sites on or near the Western border; the Yagi type [redacted] in the interior of Hungary. 50X1-HUM

Specific Equipment.

11. The R-50 Transmitter. This was a high-frequency transmitter with the following characteristics (see Figure 1):

Frequency coverage	2.5 to 15 megacycles in three bands.
Mode of operation	A_1, A_2, A_3, A_4.
Power output	400 watts.

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Weight	800 kilograms.
Power source	Three-phase 220-volt AC.

12. [redacted] more than 1000 R-50 transmitters had been built up to spring 1954. All military airports were equipped with the R-50, and shipments were made to Rumania, Albania, and possibly Czechoslovakia. The set was still in production at the Voeroes Szirka Factory up to the time of the Hungarian revolution. A long-wave version of the set was called R-51. [redacted] 50X1-HUM

13. The R-40 Transmitter. This transmitter had essentially the same operational characteristics as the R-50, except that the output power was limited to 100 watts. It consisted of two units: a power supply unit, weighing about 50 kilograms, and a transmitter unit, weighing approximately 30 kilograms (see Figure 2). The transmitter used a Philips PE 1/100 in the output stage, or its Hungarian-designed equivalent, US 51. 50X1-HUM

14. The R-10 Transmitter-Receiver Set. The R-10 was a portable battery-operated FM communications set, especially designed and built for the Hungarian army. [redacted] the frequency of operation [redacted] was about 30 to 40 megacycles. The design work for the set was completed by the Voeroes Szirka Factory in 1954; production facilities for manufacturing the set were moved in from another unknown plant. [redacted] production rate at about 200 per month [redacted] the set was still in production in November 1956. [redacted] 50X1-HUM

15. The L-1 Airborne Communications Set. Sometime in 1953, the Voeroes Szirka Factory received instructions to develop an airborne communications set for the Hungarian army and air force. Complete documentation and two early models of similar Soviet equipment were supplied. The specifications for the equipment included an intercommunications amplifier and a selector box to be incorporated into the set, as well as the following (see Figure 3):

Altitude of operation	12,000 meters.
Temperature range	-40 to 70 degrees Centigrade.
Relative humidity	99 percent.
Power supply	28 volts DC.
Transmitter power output	10 watts.
Transmitter tuning range	5.5 to 6.5 megacycles.
Receiver range	Greater than the above, but unknown.

16. Unidentified Airborne D/F Set. In 1953-1954, a group at the Voeroes Szirka Factory began developing an airborne direction-finding receiver. The antenna was a fixed ferrite core, on which two coils were wound at right angles to each other. The output from the coils was fed to two separate amplifiers, where the direction of arrival of a signal was resolved and displayed [redacted] The equipment was probably called L-2. [redacted] 50X1-HUM

Elektro Mechanikai Vallalat (EMV).

17. [redacted] EMV plant at 31 Albert Street, 50X1-HUM

Budapest. The factory was originally part of a privately-owned plant called Flumen, which the Communists took over after World War II and renamed Plant 333. In 1953, Plant 333 was split into two separate organizations: EMV and ML (for Mechanical Laboratory). The EMV plant had about 100 employees, the ML plant 400. The EMV was concerned chiefly with the development of military communications equipment. It was closely connected with the Military Technical Institute (Hadi Technikai Intezet), and many of its personnel, including the director, were military. [redacted] all telephones in the plant were monitored [redacted] 50X1-HUM

18. The plant was composed mainly of four divisions or groups with the following areas of interest:

   a. Telephone communications. This group was charged with development of field telephone equipment and test gear for the army, and also did some work on carrier frequency systems.

   b. VHF communications: This group [redacted] developed special VHF communications equipment for military vehicles. The group was once called on to provide VHF equipment for a car, [redacted] bought on the surplus market, used by the Minister of Defense. The installation in the car included a radio teleprinter. 50X1-HUM 50X1-HUM 50X1-HUM

   c. Ionospheric tracking equipment. This group was concerned with developing mobile ionospheric tracking equipment. [redacted] 50X1-HUM

   d. High-frequency transmitters. This group was concerned with developing transmitters for various military applications.

19. Ionospheric Tracking Equipment.

Group 3 was charged with developing mobile ionospheric tracking equipment. After searching Western literature, the group finally came up with a design incorporating features copied from similar American and Swedish equipment. The design was discussed with Hungarian army officials and Soviet military advisors, who ordered the immediate commencement of development of a prototype for delivery to Peiping. Work began on the first model about April 1954, and the unit was almost complete in September 1954 [redacted] an additional model was completed in 1955 and delivered to the Hungarian army. Four more units were begun in 1955 for delivery in 1956: two sets for Communist China, one for the Hungarian military, and one of unknown destination, perhaps for demonstration. [redacted] 50X1-HUM 50X1-HUM 50X1-HUM

Figure 4 shows a block diagram of the equipment. It consisted of a one-kilowatt variable frequency pulsed transmitter which swept the frequency range one to 30 megacycles about once or twice a minute. The echo signal from the ionosphere was received by a superhet receiver tuned in synchronism with the transmitter, and the resultant signal was displayed on a cathode ray oscilloscope.

20. Mobile Radio Station. [redacted] communications vehicle for the army. The project included the design of a new HF transmitter and the assembly of the 50X1-HUM

transmitter and other standard components into a complete mobile communications station. The equipment was assembled at first in a ZIS truck, then in a Hungarian Csepel truck. Figure 5 shows the external appearance of the van. The station could be operated from three-phase 380/220-volt AC power lines. The van was also equipped with a gasoline-driven generator capable of furnishing the power required for normal operation when the vehicle was stationary. When the vehicle was in motion, because of the gyroscopic effect of the heavy generator rotor, the transmitter could be used at only about half normal output power. The specifications originally called for operation at one-half normal power at a speed of 60 kilometers per hour; this requirement was later reduced to 40 kilometers per hour when field tests showed the mechanical difficulties of operation under way. The entire station had to operate under a temperature environment of 40 to 70 degrees Centigrade and up to 98 percent relative humidity.

a. Transmitter. The specifications for the new transmitter originally called for a CW power output of 400 watts. This was later changed to one kilowatt with the availability of a better output tube; on certain frequencies outputs up to 1.5 kilowatts were obtained. The following modes of operation were provided:

A_1 -- CW.

A_2 -- MCW.

A_3 -- Telephone; suppressor grid modulation, maximum 80 percent.

A_4 -- Frequency shift keying for teletype operation.

The transmitter went through at least three development variations. The final version of the transmitter is shown in Figure 6. The lower unit housed the power supply; the upper shock-mounted cabinet housed the transmitter proper. The final version had three bands covering a frequency range of 2.5 to 20 megacycles. The total weight of the complete set was approximately 450 kilograms, with the R-3 portion weighing about 120 kilograms. The transmitter output tube was a Hungarian OS-045T, a copy of the Philips PB-3/800 tube. [redacted] 50X1-HUM
[redacted] the [redacted] radio station [redacted] might carry a number in the R-50 series, since it was essentially an improvement on the R-50.

b. Stabilized Oscillator. The biggest improvement over the R-50 was the special highly-stable oscillator incorporated in the transmitter. The oscillator was developed by another group, under the direction of Genos Barany [redacted] 50X1-HUM
[redacted]. The unit was housed in a thermostatically-controlled oven and contained a quartz crystal and several mixers. [redacted] 50X1-HUM
[redacted] the oscillator easily met all requirements for 50X1-HUM frequency stability and calibration accuracy. Frequencies could be set by the calibrated dial to better than one percent. [redacted] 50X1-HUM the specifications for the oscillator called for operating at altitudes up to 6000 meters. Provisions were made in the oscillator unit for frequency shift keying. Frequency shift was obtained with a reactance tube; the amount of shift could be varied. The equipment was generally operated with 800 cps shift.

c. Antenna and Remote Tuning Unit. The transmitter could be operated either with a ship antenna mounted on the truck or with the metal tubular mast, which could be placed up to 200 meters from the truck. Figure 7 shows a sketch of the antenna and its remote-controlled tuning unit. The tuning unit was connected to the van through a 75-ohm coaxial transmission cable and a 12-wire cable for effecting the remote tuning of the antenna matching unit.

d. Receiver. The receiver was the same set used in the R-30 station. It was manufactured by the former Hungarian Standard Company and was considered the most reliable Hungarian-designed military receiver.

e. Testing. [redacted] 50X1-HUM The equipment was tested in the laboratories of the Military Technical Institute for compliance with the equipment specifications, which [redacted] were 50X1-HUM generated by the Soviet military. The institute had good humidity chambers and mechanical shake tables capable of accommodating the complete transmitter. Since no cold chamber was available, this part of the test had to be made in the refrigeration rooms of a local canning factory. No facilities were available for testing the high-altitude operation of the equipment (6000 meters). The equipment was also given extensive field tests of operation under actual field conditions. Considerable mechanical trouble developed from the requirement for the transmitter to operate while in motion, but the difficulties were overcome after the maximum speed specification was reduced from 60 to 40 kilometers per hour.

f. Production. By spring 1956, all tests had been completed and the equipment was accepted by the military. [redacted] 50X1-HUM large-scale production of the equipment was planned.

Miscellaneous Equipment.

21. [redacted] the development of a distribution 50X1-HUM system for feeding up to 30 communications receivers from a common antenna. The system was to operate on the frequency range of 2.5 to five megacycles. The biggest problem was the design of a wide-band transformer covering the frequency range. [redacted] a working model of the system had been 50X1-HUM completed with six receiver outputs instead of the required thirty.

22. [redacted] 50X1-HUM

Installations.

23. [redacted] restricted areas, including the following: 50X1-HUM

a. Szolnok, a fenced-in restricted area close to Budapest in the vicinity of the airport. [redacted] make antenna and 50X1-HUM radiation measurements in connection [redacted]

b. Satoralvahely, a Secret Police barracks. [redacted] 50X1-HUM

c. Debrecen, a military airport. [redacted] 300 MIG-type aircraft there once in 1956.

d. Gyöngyös, a barracks for tank and infantry troops.

24. [redacted] a large depot for military electronic equipment on the outskirts of Budapest. [redacted] it was referred to simply as the Center Warehouse. The installations consisted of three large buildings and several smaller ones. The area was fenced and was protected by armed guards. The warehouse contained military equipment of both Soviet and Hungarian manufacture for all branches of the service. [redacted] the Soviet equipment [redacted] was lighter in color than the Hungarian. 50X1-HUM 50X1-HUM

Personalities.

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25. [redacted]

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a. Genos Barany, group leader in the EMV. [redacted]

b. Lt. Illes Csorba, employed in the communications group of the Military Technical Institute. [redacted]

c. Adam Koronczay, former chief engineer of the EMV. [redacted]

d. Bela Muli, director of the EMV. [redacted]

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e. Istvan Nyari, employed in the EMV on telephone systems and test instruments. [redacted]

f. Istvan Szalay (or Szalai). [redacted]

g. Istvan Vydareny, head of Group 3 at the EMV. [redacted]

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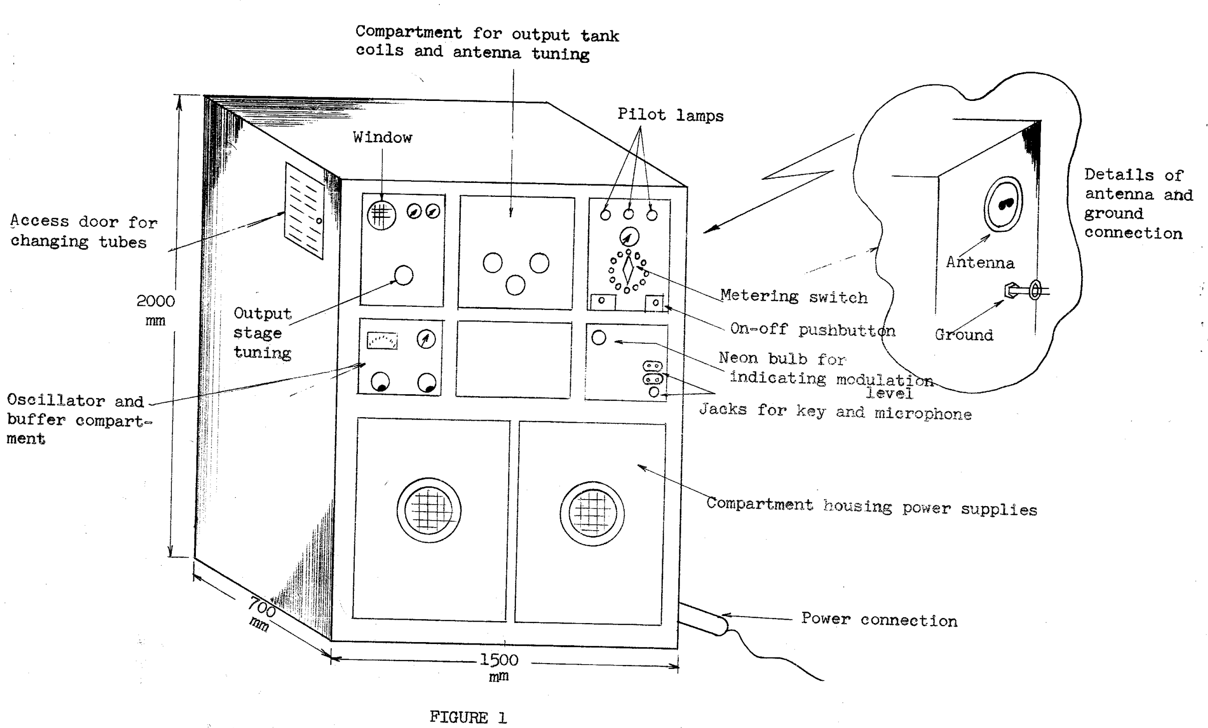

FIGURE 1

R-50 TRANSMITTER

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S-E-C-R-E-T

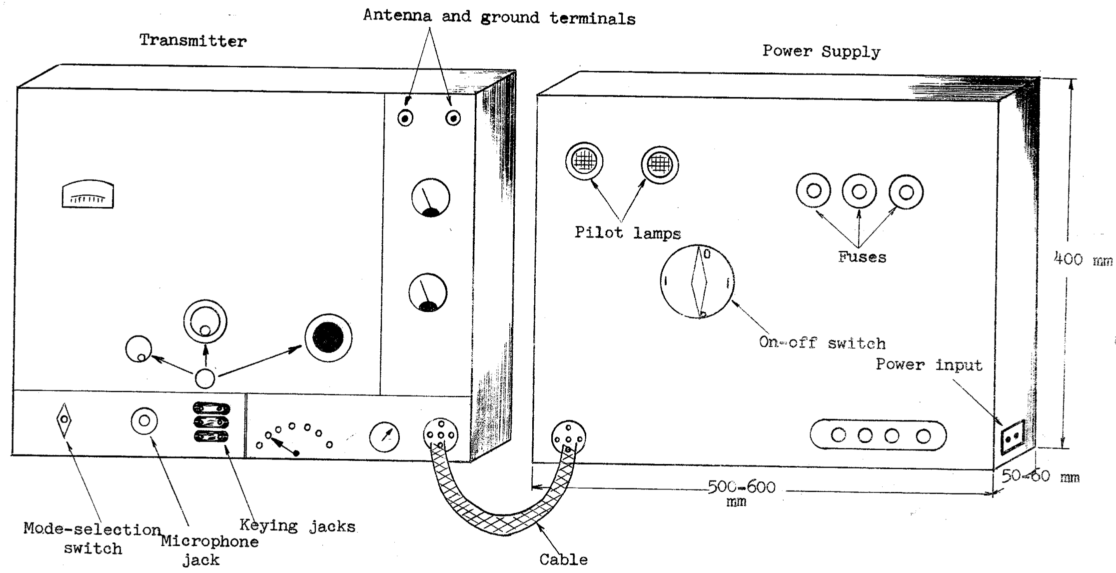


FIGURE 2

R-40 TRANSMITTER

S-E-C-R-E-T

FIGURE 3

L-1 AIRBORNE COMMUNICATIONS SET

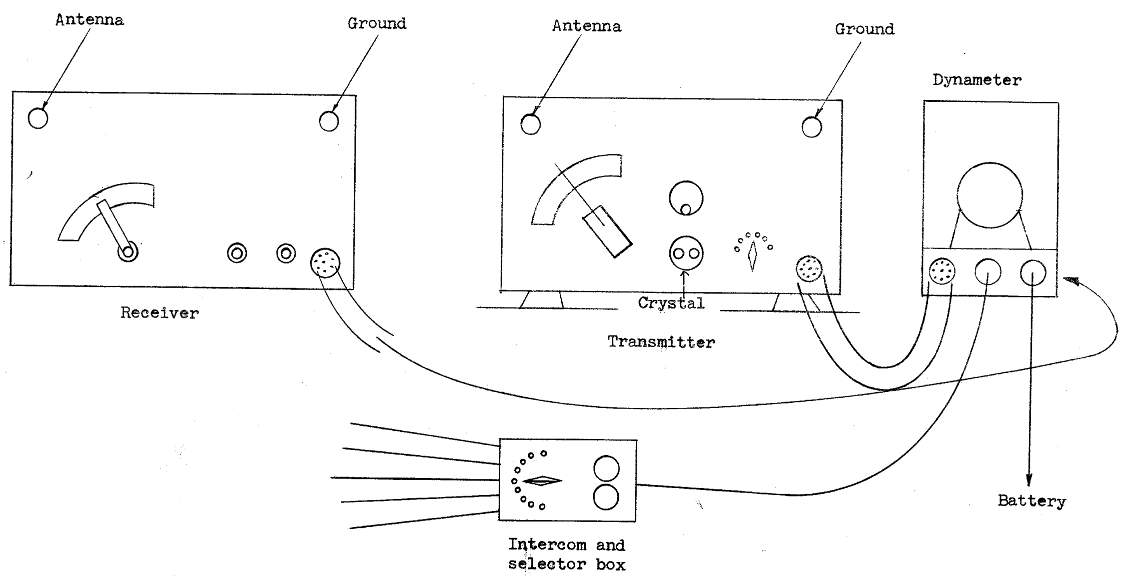
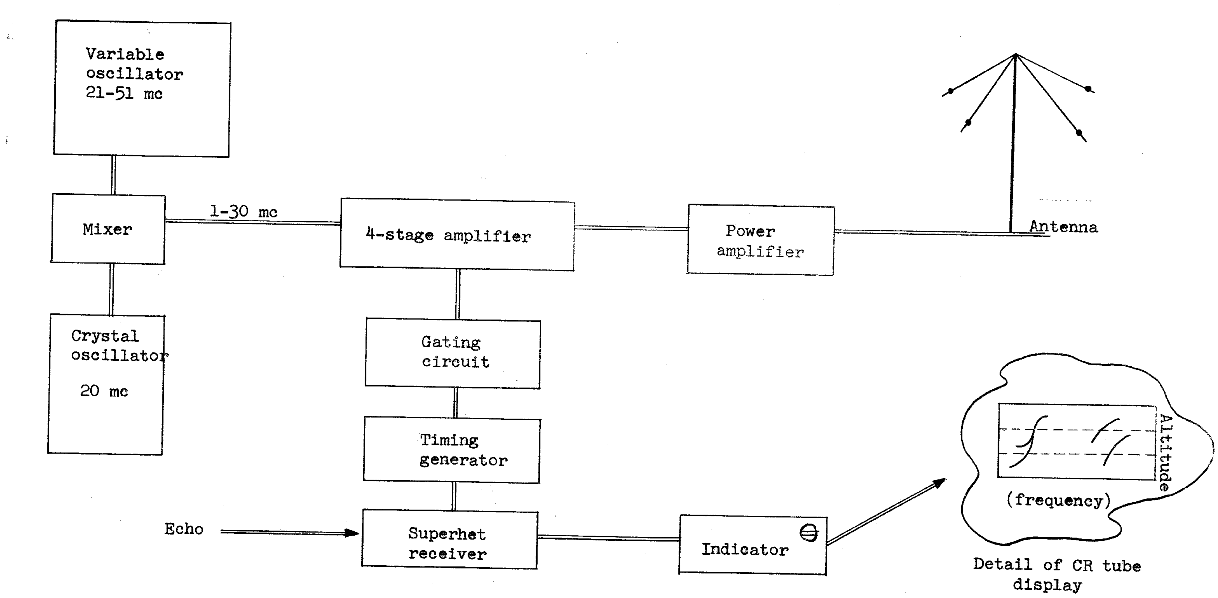


FIGURE 4

BLOCK DIAGRAM OF IONOSPHERIC TRACKING EQUIPMENT



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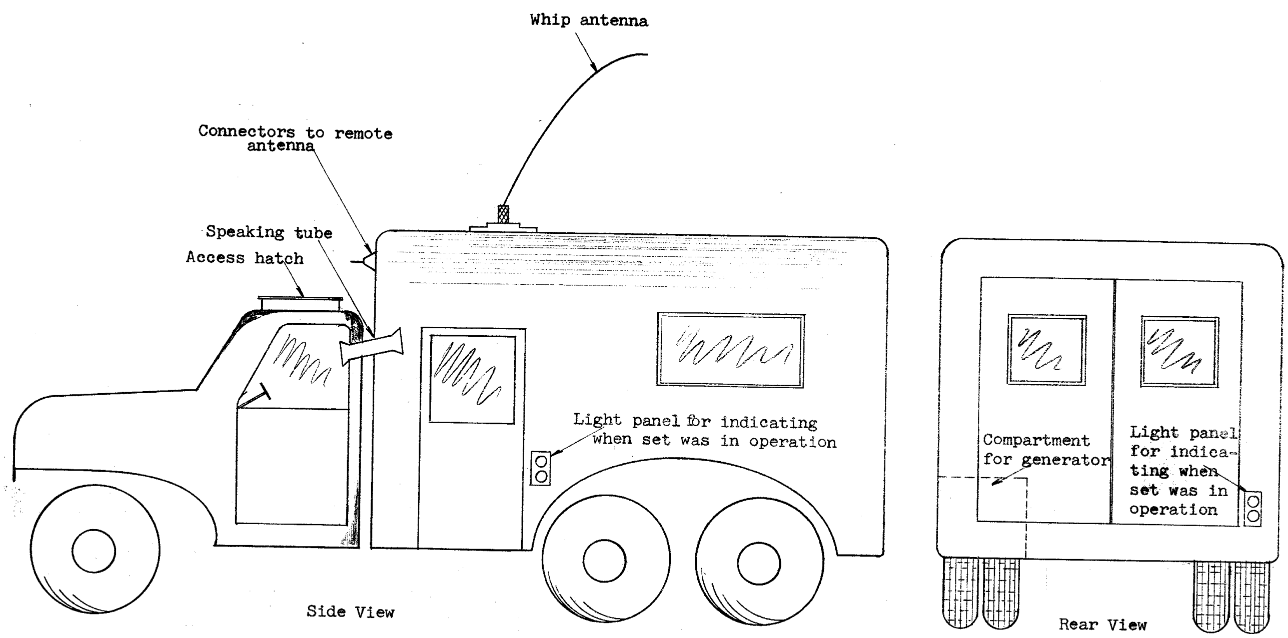

FIGURE 5

MOBILE RADIO STATION

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FIGURE 6

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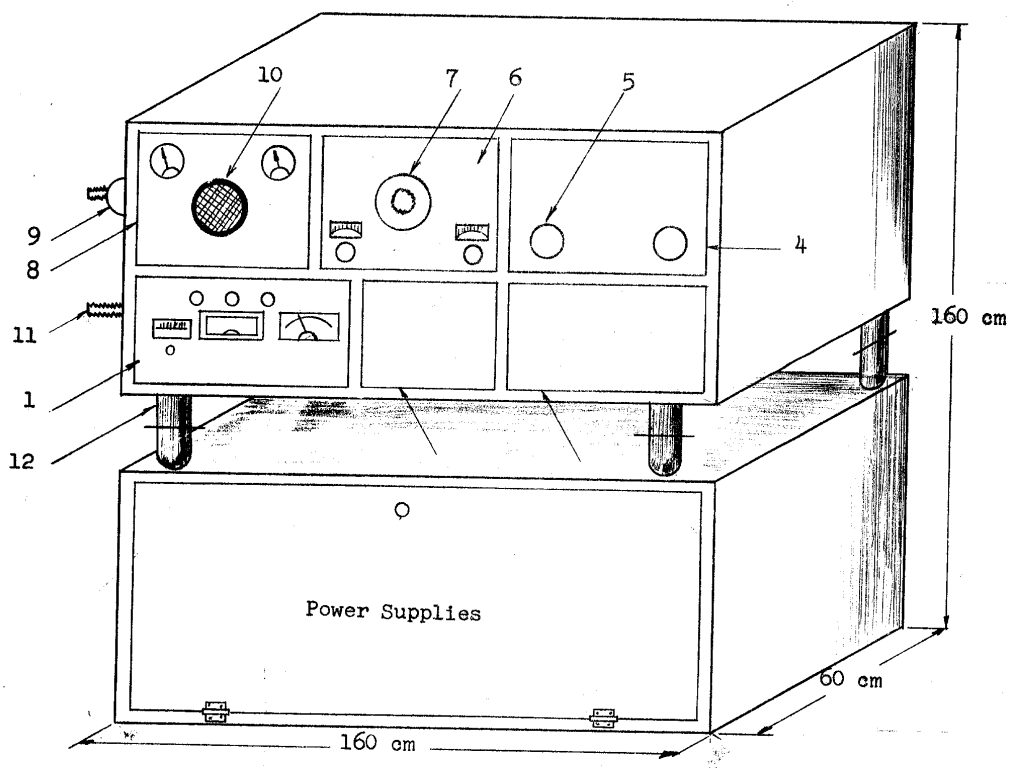
FINAL VERSION OF MOBILE RADIO STATION HF TRANSMITTER



Legend

1. Stabilized oscillator unit. The number and arrangement of the controls are only approximate.
2. Modulator unit [redacted] 50X1-HUM
3. Compartment containing frequency monitor and frequency shift keying panel, details unknown.
4. Control panel, details unknown.
5. Switch for controlling mode of operation (A_1, A_2, A_3, A_4).
6. Compartment housing tuning condensers and band-switching mechanism for driver and power amplifier.
7. Band change switch.
8. Compartment housing driver and output tubes.
9. Antenna terminal; ceramic insulator.
10. Window for observing output tube.
11. Ground terminal.
12. Rubber shock mounts, four each.

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FIGURE 7

ANTENNA AND REMOTE TUNING UNIT

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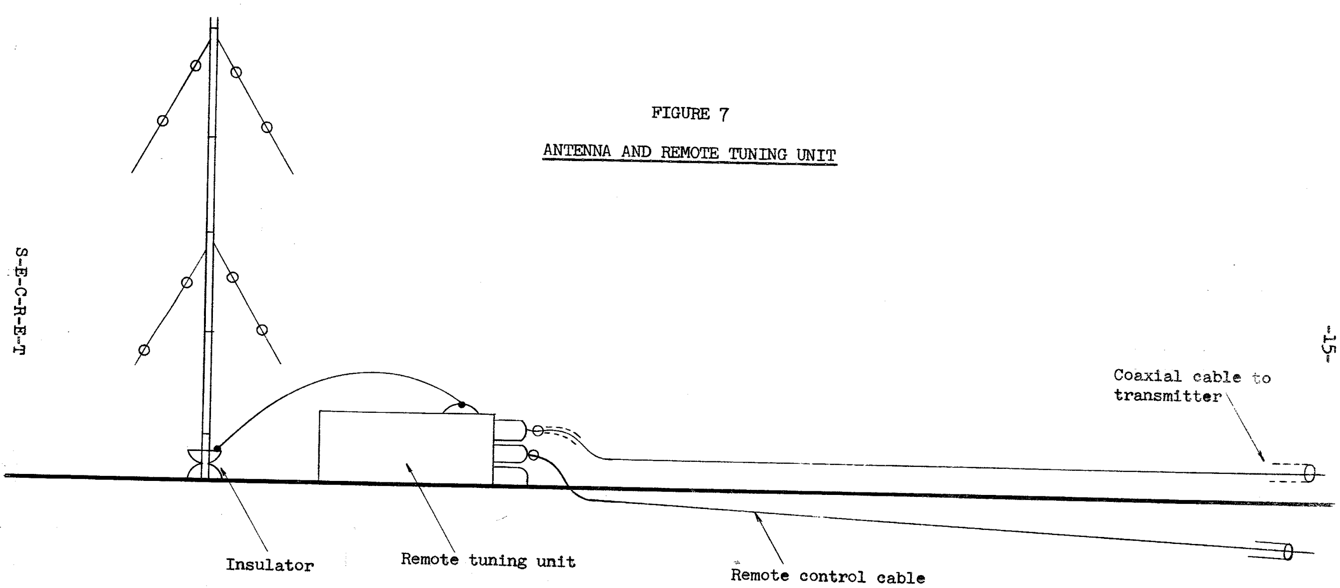

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